

The Indian Plant Variety Protection Act Beneficiaries: The Indian Farmer or the Corporate Seed Company?

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The Indian Plant Variety Protection (PVP) Act (2001) covers several issues relating to farmers' rights and the protection and registration of new plant varieties. It is a *sui generis* system developed after years of deliberation and offers tremendous freedom to farmers to continue saving and reusing seeds from their farm produce. As Indian farmers fall into diverse socio-economic classes, all of them will not benefit equally from the PVP Act. PVP issues relating to farmers' rights are discussed *vis-à-vis* their role in biodiversity conservation and plant breeding. Possible solutions to mitigate the drawbacks of long-term protection to farmers are also discussed.

The Indian Plant Variety Protection (PVP) Bill titled "Protection of Plant Varieties and Farmers' Rights Bill" passed by the Lok Sabha on 9 August 2001 is now a PVP Act. This is the first piece of legislation anywhere in the world that recognizes the phenomenal contribution of farm families in conserving biodiversity and developing new plant varieties. The PVP Act now makes it possible to register extant as well as newly-developed plant varieties and prevent the unauthorized use of registered plant varieties.

Prior to this Act, India had only a Patents Act of 1970, which did not permit the patenting of methods of agriculture and horticulture. All newly developed plant varieties were notified and released under the Seeds Act of 1966. A proposal

to draft a Plant Variety Protection Bill in India was mooted as early as in 1990 but gained momentum only after India became a signatory to the WTO/TRIPS Agreement when it became mandatory for signatory nations to protect plant varieties by patents or an effective *sui generis* system of protection or a combination of both as per stipulations of article 27.3(b) of the TRIPS Agreement.

Need for Protection of Crop Varieties

Before the advent of modern technologies in the agricultural sector, inventions based on living organisms (like the breeding of new crop varieties through hybridization, back crossing and selection) were considered as natural and obvious discoveries that could rarely be copied and did not warrant any protection

or patenting. Developments in modern biotechnology have changed this situation dramatically. Biotechnological interventions require substantial investment and its processes and products can be easily copied. Such kind of plant breeding is increasingly being carried out by large multinational commercial establishments (in many developed western countries and some developing ones) and by large state-run research institutes in a few developing nations, like China using modern technology. The establishments are naturally looking for returns on their investment to support and provide incentives for their future innovations. Intellectual property protection provides a way for ensuring financial revenues, and also protects novel innovations and crop materials from illegal commercial exploitation. Patenting (and protection) in the agricultural sector, as pioneered by the USA and recently adopted by most other developed countries which impacts on the age old tradition of free access and benefit sharing agreement previously implicit in agricultural research carried out in developing countries.

The UNDP Human Development report¹ aptly summarizes the western viewpoint by stating that “Technology is created in response to market pressures—not the needs of poor people, who have little purchasing power”. The report also states that “Policy- and not charity” is needed “to build technological capacity in developing countries”. It is clear from these statements that technology innovators in the developed nations of the west are not interested in developing

technology for public benefit of the poor and needy, but are increasingly interested in tightening the implementation of TRIPS and IPR in all fields of technology including agriculture.

Plant breeding and conservation of biodiversity have been carried out for centuries by farmers and traditional tribal communities of our country and several others of the developing world without reaping any commercial or personal benefit as envisaged under patents and PVP. Access to improved crop varieties, landraces and intellectual property through traditional knowledge was thus freely available to all without expecting any commercial returns. Organized R & D in agriculture, with an intention to increase crop yields and quality in a formal and modern scientific manner, has been carried out in India for the past six decades. In the last 4 decades, R & D in agriculture has more than adequately met the food needs of our nation, increasing food grain yields from 50 m tonnes in 1950 to nearly 200 m tonnes in 2000, which is enough to keep at bay large scale famines and malnutrition among the poor. This revolution could not have been achieved without free access to improved wheat and rice germplasm containing wheat rust resistant genes from within the country and from international crop research institutes. It is natural that a strict regime of patenting and protection appears un-attractive to countries such as India because it is seen as limiting the free exchange of gains from technology. In conclusion, improved R & D in agriculture has been used in India (and other developing nations) for public good

and not for commercial gains and has been precisely the reason for which it is not intended for in developed nations.

India has purposefully opted for a *sui generis* system of protection of plant varieties instead of patents in order to recognize contribution of farmers and tribals made over centuries towards germplasm conservation and selection to incorporate equity concerns of farmers and village communities. As a consequence of this policy, farmers continue to have privileges that they enjoyed before enactment of the Act. Reasons for protecting farmers' rights are many fold and can be brought out by examining the status of our farmers and the pattern of the seed trade in India *vis-a-vis* those of the world.

Status of the Indian Farmer

India has 600 million farmers whose average farm holdings are 1.55 hectares. Comparing this with the USA where only 10 lakh individuals are classified as farmers with average holdings of 200 ha. Agriculture accounts for 26% of India's GDP and so any decision concerning agriculture affects the livelihoods of farming communities and the Indian economy in a big way. The majority (78%) of farmers are small, marginal and submarginal and have holdings of 0.2–1.4 hectares. Poverty and malnourishment are widespread among such farm households. These farmers occupy 33% of the cultivated land while medium and large farmers who hold on an average 2.7–8 hectares per family constitute 22% of all farmers and occupy 67% of cropped land².

Where do Indian Farmers Get Their Seeds to Plant Their Next Crop?

Farmers in India have for ages been using seed saved from their produce to raise the following year's crop. In most self pollinated crops (e.g wheat and pulses) the practice is followed until reduced yields induce them to buy new seed. Farmers who plant hybrid seed lose the advantage of heterosis when second generation seed is used. Seed replacement in hybrids therefore is higher than in pure lines and varieties. The concept of purchasing high quality and pure seed is about 40 years old and began in India with the inception of the National Seeds Corporation (NSC) in 1966, State Farms Corporation of India (SFCI) and the Tarai Development Corporation (TDC) in 1969. Seed replacement with certified or truthfully labelled seeds ranges from as low as 5% in pulses (self pollinated) to 42% in pearl millet (largely hybrid and open pollinated)³. This means that 60–95% of the seeds sown are saved from the previous year's crop.

Saving seed is often not an optimal practice from the modern scientific view for reasons of poor seed viability and contamination with pests and pathogens. In India and other developing nations, state-run seed agencies attempt to provide clean healthy seed at affordable rates. However, small farmers cannot even afford these 'low' prices of new seed annually. The other reason for reluctance to buy new seed is due to the traditional and deep spiritual importance attached to the fertility and reproduction of grain crops in Africa, Asia and parts of America such that the right to save seed is

strongly perceived as a necessity and right. The negative outcome of such traditional agriculture is low crop yields as compared to that achieved with good quality seed. The positive outcome of traditional agriculture is the benefits accruing from associated environmentally sustainable practices. It is of little surprise therefore that farming communities have contributed immensely to the protection and conservation of biodiversity despite their weak socio-economic condition.

Farmers are Active Conservers of Germplasm and Developers of Land Races

Farmers in India often maintain a variety of valuable indigenous germplasm at their personal cost (Table 1). Take the example of several rice varieties possessing special attributes that are still grown in tribal belts of Orissa, Kerala and Tamil Nadu because they possess medicinal properties and valuable traits of use in religious festivals.

Farmers own selections from local material have also often led to the development of new varieties. For example, in 1987, during one of the worst

droughts, farmer Thakar Singh of Junagadh, Gujarat, selected a few exceptional groundnut plants derived from seeds distributed by the government to overcome the shortage of planting material and developed 'Morla' a pure line with curved compact pods and very large kernels after several selections⁵. There are countless examples of traditional communities in India and in several countries of the developing world contributing to the development of new varieties and saving bio-diversity. A good example is that of rice which goes back several thousands of years in Asia's agricultural history. It is estimated that over time, rural communities generated over 140,000 rice varieties of which some 80,000 are stored in the International Rice Research Institute (IRRI), Los Banos, Phillipines. Some grow well under drought, others withstand pests while some others are aromatic, sticky and of medicinal value and have over time allowed farmers and consumers to meet their needs⁶. We therefore have an obligation to recognize and protect these traditions and contributions made by rural families. It is in this backdrop that aspects

Table 1—Valuable land races of rice and small millet conserved by tribal farmers for a variety of uses⁴

State	Variety	Predominant Quality	Purpose of conservation
Orissa	Kalakrishna	Scented	All festivals
	Tulsi	Scented	Chaitra Parva festival
	Haldichudi	White short slender grains, good taste	Shakti Puja festival
	Macchakanta	White short slender grains, good taste	Manabas and Lakshmi Puja
	Deulabhoga	Bold short grains, reddish on cooking, mild scent	Offering for deities (due to scent and colour)
Kerala	Mer	Black grain, medicinal properties	Annual ceremony for forefathers
	Njavara	Medicinal properties	For stomach ailments
Tamil Nadu	Landraces of small millet	Rich in micro-nutrients and vitamins	For good health and appetite

of the Indian *sui generis* PVP Act and its implications to the benefit and development of Indian Agriculture- to farmers, to traditional communities, to plant breeders both in the public sector and in the corporate sector are analysed.

Indian PVP Act

The four major objectives of the Act are:

- To recognize and protect the rights of the farmers for their contributions made in conserving, improving and making plant genetic resources available for the development of new varieties .
- To protect plant breeders' rights, to stimulate investment for research and development, both in the public and private sector, for the development of new plant varieties.
- To facilitate the growth of the seed industry in the country to ensure the availability of high quality seed and planting material to the farmers.
- To make provisions in compliance with article 27.3(b), for giving effect to subparagraph (b) of paragraph 3 of article 27 in part II, of the Agreement on Trade- Related Aspects of Intellectual Property Rights (TRIPS). This subparagraph deals with patents and protection of plant varieties.

Features of the PVP Act

Features of Protection

- Scope of protection is to all categories of plants except microorganisms, as decided by the competent authorities from time to time, with initial period of

protection granted for four years and six years respectively.

- 18 years protection for trees and vines and 15 years for all other plants and extant varieties. Renewal of rights after 6 years.
- A new variety must be novel, distinct, uniform and stable and farmers' and extant varieties need not satisfy novelty requirement.

Farmers' Rights

- Right to save, use, exchange, share and sell farm produce of a protected variety, except sale of branded seed.
- Farmers' recognized as breeders with enforcement to register plant varieties.
- Farmers are to be compensated for low initial performance under specified conditions.
- Farmers are exempted from payment of all kinds of fees including registration and maintenance fees.
- Farmers are to be protected from penal action acts of innocent infringement on qualified circumstance.

Communities' Rights

- Recognition of the role of traditional and rural communities in conserving and preserving genetic resources of land races and wild relatives of crops and
- Eligibility for compensation for the contribution made by village or local communities in evolution of a variety. Such compensation is to be determined by PVP authority and deposited in the National Gene Fund (NGF).

Researchers' Right

Free access to protected varieties for bona fide research use including development of new variety using the protected varieties as the initial varieties, provided such development does not involve repeated crosses of a protected variety.

Plant Breeders' Rights

Exclusive rights to produce, sell, market, distribute or export the protected variety directly or through an agent or licensee.

Sharing of Benefits Accrued from Protected Varieties to a Plant Breeder Subjected voluntary declaration by a breeder or on establishment of the fact that a given new variety was developed using indigenously derived genetic resources from public institutions, NGOs, private breeders, village or tribal communities, a part of the commercial proceeds from such variety shall be required to be paid as the benefit share. Such benefit share may have to be deposited in the NGF.

A person who cultivates land either by himself or under his direct supervision, and a person who conserves and preserves wild species or traditional varieties is a 'farmer'.

A variety, traditionally cultivated and evolved by a farmer (or group of farmers or a community) or a wild relative or land race is a 'farmers' variety'.

The new Act only allows for registration of new crop varieties but does not protect absolute 'commercial interests' of the breeder or institution that develops a new variety because it gives

space for farmer's rights to grow, sell, resell and save seed of registered varieties. The Act is therefore a Farmers' Rights (FR) Act and not a Plant Variety Protection Act. FR, in fact needs legislative protection whereas PBR is granted to new plant variety. India thus harnesses both these rights. Who then is the ultimate beneficiary of the PVP Act and how will it affect the various stakeholders-traditional farming communities, the private sector plant breeder and private seed company or the public sector (and thereby the public). Is the benefit to the stakeholder ultimately beneficial in the long term?

The Indian Farmers' Perspective of the PVP Act

Indian farmers are highly heterogeneous in terms of land holdings and income levels and will not benefit from the PVP Act in identical terms. For the purpose of this discussion we shall treat them in three groups: (a) marginal farmers belonging to tribal regions, (b) small and medium farmers' and (c) large progressive farmers.

Tribal and Marginal Farmers

India had a large population of tribals most of who depend on agro-forestry. These farmers rarely adopt modern methods of cultivation methods and crop varieties, whether private or public sector derived⁷. They will therefore remain unaffected by any growth in the plant breeding industry. On the contrary, if they continue to remain 'illiterate' and unaware of FR they stand to lose from the unauthorized use of their land races and

other germplasm. Nevertheless if their role as preservers of biodiversity is to be recognized then conscious and selfless efforts to compensate their contributions will have to be made by Government agencies and non-partisan NGOs.

Small and Medium-sized Farmers

Small and medium farmers who lack resources and necessary technical awareness to use modern farming methods are highly vulnerable to the risks of high input farming. The plight of this section of farmers is aptly illustrated by the experience in Warangal district of Andhra Pradesh. Lured by promises of high yields and profits by large seed companies these farmers abandoned sustainable farming methods and cropping patterns in favour of hybrid cotton – a cash crop. Both nature and science failed them when their crops became resistant to the indiscriminate use of pesticides^{8,9}. This group of farmers could benefit immensely from new technology provided they are educated about the gains and possible risks posed by modern agriculture along with a strong awareness of integrated pest management techniques and other proven methods of sustainable agriculture.

Large Farmers

This small section of farmers have greater risk taking ability and have occasionally taken the lead to develop research institutes at their own initiative. The Vasantdada Sugar Institute (VSI) in Tal-Haveli Distt, Pune, was set up in 1975 by annual subscriptions from sugar factories and sugar cane growers¹⁰. There

is a similar research institute for development of grape cultivars in Maharashtra. These efforts demonstrate that farmers who are financially secure are aware of the benefits of new technology and are willing to pay for it. Such farmers clearly stand to gain from 'commercial protection' of crop varieties.

The perspective of the Corporate Seed Company: Domestic seed sales in India are still very low and the seed industry, in principle, stands to gain tremendously from the new PVP Act which should boost seed sales. However, the strong FR component in the PVP Act limits the profits from the development and sale of pure line varieties. For these reasons the private sector plant breeder will concentrate on the highly remunerative hybrid seed sector while the onus of developing varieties and pure lines for high input and marginal areas will fall upon the public sector and the farmers. This is apparent from the phenomenal growth in the number of vegetable hybrids released for cultivation by the private sector which in the last ten years has increased from below 50 to 400¹¹.

Perspective of the Public Sector Plant Breeding Institutions

The IPR problem: Plant breeding carried out under the Indian Council of Agricultural Research (ICAR) has been the backbone of the green revolution of the 1960s largely due to unbridled access to useful germplasm. In the last decade however, productivity levels have tapered off and food grain production has slowed to 1.5%¹². If food security has to be maintained in an ecologically sustainable

manner, judicious application of modern biotechnological tools to plant breeding will have to be explored.

The inherent problem with agricultural biotechnology is that its methods and products are increasingly being patented and licensed to the private sector. Patenting of each incremental improvement in a crop means successive layers of IPR 'accumulate' such that germ plasm is 'highly IP encumbered'. Consequently, the flow of knowledge and plant material between the public and private sectors for the purpose of commercial utilization is restricted. Also, agricultural biotechnology is dominated by a small number of multinational companies from developed countries that own many of the important IPR in this field leading to the concentration of power in the hands of a few. For example of 270 patents on the soil bacterium *Bacillus thuringensis* granted between 1987 and 1997 in countries of the Organization for Economic Cooperation and Development (OECD), 60% were owned by only six MNCs¹³. Even in staple foods like rice, which is covered by 160 patents, 81 patents are held by only 13 transnational companies¹⁴ (Table 2).

The private sector overcomes this problem by cross-licencing its patents for others without financial compensation. For public sector plant breeders who do not have IPR to trade, licensing negotiations may be impossible. IPR is however an uncomfortable reality and is to be expected when commercial organizations are involved. Unfortunately, agricultural research institutions in the public sector generally

lack the necessary legal expertise to manage IPR and will have to overcome it in the future.

The Way Ahead

The Indian farmer deserves protection because of his enormous contributions to biodiversity conservation. The questions that follow then are:

Do all farmers deserve equal protection? 'Protection' under the PVP Act is directly proportional to the contribution of the farmer in conservation of land races and development of 'farmers varieties'. Any such legislation is bound to encounter limitations in its implementation. This is more so in the case of the Indian peasantry who are numerically enormous, less literate and less resourceful than other sections of society. It is of utmost importance, in this context, that scientists, lawyers, NGOs and other informed sections of the society take on the responsibility of generating the required awareness among 'farmers'.

The PVP Act will boost plant-breeding activity especially in the private sector resulting in an increased choice of germplasm. However, all farmers will not benefit equally because the corporate sector seed companies will concentrate on hybrid seed production and high input farming. Small and medium farmers will have to depend upon seeds and technology generated by the public sector plant breeder. The small and medium farmers suffer from paucity of capital and more importantly, lack of awareness. The public sector plant breeding institution and the domestic seed sector suffer from poor access to protected technology

Table 2—Top biotechnology patent holding companies in rice (1998)

Company	Country	Number of patents
Pioneer Hi-Bred International	USA	17
Mitsui-Toatsu	Japan	13
Monsanto	USA	9
Japan Tobacco	Japan	8
Novartis	Switzerland	5
Advanced Technologies	UK	4
AgrEvo	Germany	4
Cornell Research Foundation	USA	4
Mitsubishi chemicals	Japan	4
Sumitomo chemicals	Japan	4
Du Pont	USA	3
Kubota	Japan	3
Zeneca	UK	3

largely in the hands of the large multi national seed companies through patents and licences.

The solutions have to address all categories of farmers and should include the following: (1) Increase public sector expenditure in biotechnology and modern plant breeding technologies and ensure that the fruits of modern plant breeding technology are pro-poor. The public sector should work towards becoming technically equipped and competent in manpower development and education to benefit from new tools of biotechnology. (2) Encourage a healthy and competitive balance between public and private R&D investment into the development of new crop varieties if all farmer's categories are to benefit. (3) Make state run extension services much more aggressive in imparting benefits of new technology to farmers and ,more importantly, educate

them about the harms of its excessive use. Small and medium farmers should be equipped to exercise their choice over the adoption of new technology. Integrated pest and nutrient management technologies need to be vigorously popularized among small and medium farmers so that more Warangal-like episodes are not repeated and (4) Farmers have to be assisted in *in situ* biodiversity conservation if the clause of 'benefit sharing' in the PVP Act is to be implemented as a reality.

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